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Attorney Docket No. 01597/LH

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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Melissa Marks
Melissa Marks

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Applicant	:	Thord A. G. NILSON
Serial No.	:	09/937,802
Filed	:	February 11, 2002
For	:	ROTOR FOR A HIGH SPEED PERMANENT MAGNET MOTOR
Art Unit	:	2834
Examiner	:	J. A. Aguirrechea
Appeal No.	:	

APPEAL BRIEF

Commissioner for Patents
Washington, D.C. 20231

Applicant hereby appeals the Final Rejection of claims 1-6 of the above-identified application as set forth in the Final Office Action dated October 9, 2002 and the Advisory Action dated December 27, 2002, both issued by Examiner Jaydi A. Aguirrechea of Group Art Unit 2834.

A Notice of Appeal was received in the Patent Office with the appropriate fee on January 14, 2003. Accordingly, this Appeal Brief is being timely filed before the due date of March 14, 2003.

Pursuant to 37 CFR 1.192, this Appeal Brief is being submitted herewith in triplicate, together with a check in the

amount of $320.00 in payment of the requisite fee under 37 CFR 1.17(c). Please charge any additional fees which may be determined to be required, or credit any overpayment, to Deposit Account No. 06-1378.

(1) Real Party in Interest

The real party in interest is the assignee of the present application, namely, INMOTION TECHNOLOGIES AKTIEBOLAG, a corporation of Sweden, having a business address in Stockholm, Sweden.

(2) Related Appeals and Interferences

There are no related appeals or interferences.

(3) Status of claims

This is an appeal from the Final Rejection of claims 1-6. Claims 7-8 have been allowed. The appealed claims are set forth in the attached Appendix.

(4) Status of Amendments

A first Office Action was issued on May 28, 2002.

In response to the first Office Action, an Amendment was filed on August 27, 2002 in which claims 1-8 were amended.

A Final Office Action was issued on October 9, 2002 in which amended claims 7-8 were allowed, and amended claims 1-6 were

rejected under 35 USC 103. In the Final Office Action, the Examiner also asserted that the specification failed to meet the requirements of 35 USC 112, first paragraph, and the Examiner rejected amended claim 1 under 35 USC 112, second paragraph.

An Amendment under 37 CFR 1.116 was filed on December 10, 2002 in response to the Final Office Action. In the Amendment under 37 CFR 1.116, the specification was amended to overcome the rejections under 35 USC 112, first and second paragraphs. No amendments, however, were made to the claims.

An Advisory Action was issued on December 27, 2002. In the Advisory Action, the Examiner approved the amendment to the specification and withdrew the rejections under 35 USC 112, first and second paragraphs. In the Advisory Action, however, claims 1-6 were again rejected under 35 USC 103.

Thus, the appealed claims are claims 1-6 as amended in the Amendment filed August 27, 2002.

(5) Summary of the Invention

The present invention is directed to a rotor for a high speed permanent magnet motor comprising a central spindle, a plurality of magnet discs stacked on the spindle, and a clamping device provided on the spindle for exerting an axial clamping force on the magnet discs to form an axially pre-tensioned disc packet. Such rotors are operated at high speeds (i.e., 20,000 to 50,000 rpm) and the magnet discs are subjected to high

centrifugal stress, so that it is necessary to reinforce the rotors. Conventionally, reinforcement has been achieved by an outer sleeve enclosing the permanent magnetic material parts of the rotor.

According to the present invention as recited in claim 1, by contrast, a reinforcement disc of a non-magnetic high-strength material is provided at least one of (i) between at least every second magnet disc, and (ii) between at least one of the magnet discs and the clamping device. More specifically, as recited in claim 1, the reinforcement discs have substantially a same outer dimension as the magnet discs, and each reinforcement disc is clamped by the axial clamping force between the at least every second magnet disc or between the at least one magnet disc and the clamping device, thereby accomplishing a frictional engagement between reinforcement discs and the magnet discs for transferring centrifugal forces from the magnet discs to the reinforcement discs, and thereby relieving the magnet discs of tensile stress. (See the disclosure in the specification at page 3, line 28 through page 4, line 15.)

(6) Issues

The only issue presented for review is whether the subject matter of claims 1-6 is patentable over the combination of JP 06245473 A ("Takemoto et al") and JP 09043418 ("Miura et al") and/or USP 5,448,123 ("Nilson et al") under 35 USC 103.

(7) Grouping of Claims

The Board's authority to select a single one of claims 1-6 for review with respect to the Final Rejection in accordance with the provisions of 37 CFR 1.192(c)(7) is hereby acknowledged.

(8) Argument

In the Final Office Action, the Examiner asserts that Takemoto et al discloses a rotor having a central spindle (3), a plurality of discs (1) stacked on the spindle, a "clamping device (11)" for exerting an axial clamping force on the magnet discs, and "a reinforcement disc, flat in shape, provided between two magnetic discs (Figure 6)".

While the Examiner is correct that Takemoto et al does disclose a rotor having a central spindle and a plurality of discs stacked on the spindle, the Examiner is not correct that Takemoto et al discloses a "clamping device (11)" for exerting an axial clamping force on the magnet discs, and "a reinforcement disc, flat in shape, provided between two magnetic discs (Figure 6)".

In paragraphs [13], [14] and [15] of the English language translation of Takemoto et al provided by the Examiner, it is disclosed that a resin (7) may be molded into a collar (11) which prevents an edge of end faces of the permanent magnet discs (1) from being chipped, cracked or damaged.

It is respectfully submitted, however, that there is absolutely no disclosure in Takemoto et al teaching or suggesting

that the collar (11) acts to apply an axial clamping force on the magnet discs (1) in the manner asserted by the Examiner. Accordingly, it is respectfully submitted that Takemoto et al fails to disclose, teach or suggest the clamping device of the present invention as recited in claim 1 which exerts an axial clamping force on the magnet discs to form an axially pre-tensioned disc packet.

In addition, it is respectfully pointed out that structure shown in Figure 6 of Takemoto et al which the Examiner asserts to be a reinforcement disc is merely a spacer (2) formed between two permanent magnet pairs. (See the disclosure in paragraph [19] of the specification of the English language translation of Takemoto et al provided by the Examiner.) And it is respectfully submitted that there is absolutely no disclosure in Takemoto et al teaching or suggesting that the spacer (2) acts as a reinforcement disc in the manner asserted by the Examiner. Accordingly, it is respectfully submitted that Takemoto et al fails to disclose, teach or suggest the feature of the reinforcement discs of the present invention as recited in claim 1 which are frictionally engaged with the magnet discs to transfer centrifugal forces from the magnet discs to the reinforcement discs, thereby relieving the magnet discs of tensile stress.

In support of the above assertions that the collar (11) and spacer (2) of Takemoto et al do not correspond to the clamping device and reinforcement discs of the claimed present invention, it is respectfully pointed out that the invention disclosed in

Takemoto et al relates to a stepping motor which is typically operated at low speeds of 200 to 2000 rpm. Such stepping motors are not subjected to high centrifugal stress, and it is therefore not necessary to reinforce the magnet discs of the rotors of such stepping motors.

By contrast, the claimed present invention is directed to a rotor for a high speed permanent magnet motor which is operated at high speeds (i.e., 20,000 to 50,000 rpm). The magnet discs of the rotor of such high speed motors are subjected to high centrifugal stress, so that it is necessary to reinforce the magnet discs in the rotor for a high speed motor of the claimed present invention. According to the claimed present invention, this reinforcement is achieved by provided a reinforcement disc at least one of (i) between at least every second magnet disc, and (ii) between at least one of the magnet discs and the clamping device, in a manner such that the reinforcement discs and magnet discs are clamped by the axial clamping force of the clamping device to accomplish a frictional engagement between the reinforcement discs and the magnet discs for transferring centrifugal forces from the magnet discs to the reinforcement discs, thereby relieving the magnet discs of tensile stress.

In short, it is respectfully submitted that the Examiner has merely identified components in Takemoto et al which are located in similar positions as the clamping device and reinforcement disc of the claimed present invention, and that on the basis of position alone the Examiner has asserted that these components in

Takemoto et al structurally correspond to the clamping device and reinforcement disc of the claimed present invention. However, as pointed out hereinabove, the features of the clamping device and reinforcement disc of the high speed rotor of the claimed present invention are not required in the low speed stepping motor of Takemoto et al, and there is absolutely no teaching or suggestion in Takemoto et al that the components thereof identified by the Examiner do in fact achieve the claimed structural features of the clamping device and reinforcement disc of the present invention as recited in claim 1.

With respect to Miura et al (which does relate to a high speed motor), it is respectfully pointed out that the titanium reinforcement ring (3) thereof forms an outer sleeve which surrounds the permanent magnet discs (2) thereof. (See Figure 1 of Miura et al.) Accordingly, it is respectfully submitted that this structure merely corresponds to the conventional structure described in the Background of the Invention portion of the specification of the present application. And it is respectfully submitted that Miura et al completely fails to disclose, teach or suggest the feature of the present invention as recited in claim 1 whereby reinforcement discs having substantially a same outer dimension as the magnet discs are provided between the magnet discs to relieve the magnet discs of tensile stress.

With respect to Nilson et al, moreover, it is noted that this reference has merely been cited for the disclosure therein of electrical insulating layers.

As explained in the Amendment under 37 CFR 1.116 filed on December 10, 2002, the structure of the rotor of the claimed present invention achieves several advantageous effects over the prior art. Namely, the structure of the claimed present invention: (i) achieves reinforcement of the magnet discs only by frictional engagement between the reinforcement discs and the magnet discs without providing any structure located radially outside the magnet discs; (ii) enables the cylindrical outer surface of the rotor to be machined by grinding <u>after</u> assembly so as to guarantee that the rotor is perfectly cylindrical in shape and fit to run perfectly true relative to its axis so that the rotor is apt to cope with high speed operation without causing any vibrations (whereas by contrast in the rotor described by Miura et al the magnet discs and the surrounding reinforcement rings have to be accurately machined before assembly); and (iii) enables the air gap between the magnet discs and the stator to be kept very small, which means that the efficiency of the motor is high. Accordingly, the structure of the claimed present invention achieves a slender rotor design which can be operated at high speed and utilized in handheld power tools where the available space is limited.

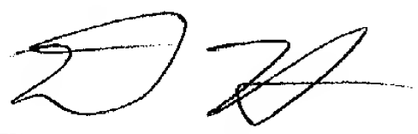
It is respectfully submitted that the Examiner has completely disregarded how the clamping device and reinforcement discs of the claimed present invention work together to achieve a novel structure and novel operational effects, and that the Examiner has merely identified elements in the primary reference

(Takemoto et al) which just happen to be located in the same positions as the clamping device and reinforcement discs of the claimed present invention - and which do not at all work together to achieve the novel structure and operational effects of the claimed present invention.

In summary, it is respectfully submitted that the Examiner's assertions with respect to the teachings of Takemoto et al have no basis in fact, and that the combination of Takemoto et al with Miura et al and/or Nilson et al does not at all achieve or render obvious the above described structural features and advantageous effects of the claimed present invention.

In view of the foregoing, it is respectfully requested that this Honorable Board reverse the rejection of appealed claims 1-6.

Respectfully submitted,



Douglas Holtz
Reg. No. 33,902

Frishauf, Holtz, Goodman & Chick, P.C.
767 Third Avenue - 25th Floor
New York, New York 10017
Tel. No. (212) 319-4900
Fax No. (212) 319-5101
LH\DH:mbm

Attachment: (1) Appendix of Appealed Claims
(2) Check for $320.00

(9)

APPENDIX OF APPEALED CLAIMS

1. (Amended) A rotor for a high speed permanent magnet motor comprising:

a central spindle,

a plurality of magnet discs stacked on said spindle,

a clamping device provided on said spindle for exerting an axial clamping force on said magnet discs, thereby forming an axially pre-tensioned disc packet, and

a reinforcement disc of a non-magnetic high-strength material provided at least one of (i) between at least every second magnetic disc, and (ii) between at least one of said magnetic discs and said clamping device,

wherein the reinforcement discs have substantially a same outer dimension as the magnet discs, and

wherein each reinforcement disc is clamped by said axial clamping force between said at least every second magnet disc or between said at least one magnet disc and said clamping device, thereby accomplishing a frictional engagement between said reinforcement discs and said magnet discs for transferring centrifugal forces from said magnet discs to said reinforcement discs, and thereby relieving said magnet discs of tensile stress.

2. (Amended) A rotor according to claim 1, wherein one said reinforcement disc is located between every two adjacent magnet discs.

3. (Amended) A rotor according to claim 1 or 2, wherein each one of said magnet discs comprises at least one electrically insulating layer.

4. (Amended) A rotor according to claim 1, wherein said reinforcement discs are flat in shape.

5. (Amended) A rotor according to claim 1, wherein said reinforcement discs comprise a high-strength metal.

6. (Amended) A rotor according to claim 1, wherein said reinforcement discs comprise a ceramic material.